
Homework Assignment #14

Everyone of us had a favorite toy when we were growing up. Mine was a GI-Joe: Dr. Mindbender, which my grandmother gave me for christmas in 1986. His cape, flamethrower, eye patch, pink trousers and mustache made him the most progressive, and coolest looking GI-Joe in the playground!



Without a hint of sarcasm, one of the things that troubled me as a 5-year old boy, was the fact that Dr. Mindbender had no free will. It really saddened me that when left alone in a shelf, he would just sit there... sadly gazing the wall with a stiff, passive pose. Fortunately, we now live in the age of micro-controllers, and we have the power and skill to animate our childhood toys.

For this homework assignment, I would like you to pick a toy. This toy doesn't have to be Dr. Mindbender, but it has to be something you will truly enjoy hacking and animating. You pick... cars, barbie dolls, furby's, Teenage Mutant Ninja Turtles or anything else you remember playing with. I would like you to "give life" to your chosen toy by using any piece of technology available

to you. In particular I would like you to create **four** very distinct software functions that will animate the toy. You use anything you want to help you out in the process.

Lets take Dr. Mindbender as an example. I would like to:

- 1) Move one of his legs
- 2) Blink his eye patch
- 3) Create a dynamic symbol on his chest
- 4) Move one of his arms

I would probably glue one leg of Dr. Mindbender to a wooden box and connect two servo motors (to move his arms and leg) to an Arduino. I would also drill an hole into his head and insert an LED in there. For the chest symbol, I would take a seven segment display from the lab and hot glue it. Feel free to use any materials from the lab, however you may also want to check out the sparkfun (www.sparkfun.com) if you need extra components.

Using the Arduino, I want you to create a **four separate** functions, one for **each** of the four actions, and run them separately. Note that your tasks must operate independently of each task. On future home-works we are going to implement a real time operating system (RTOS) that will run all the tasks at the same time. For example, creating two separate tasks that moves the same Dr. Mindbender leg on different directions will not work, since in a RTOS you cannot move the same leg in two opposite directions at the same time.

Also, this homework project will be used as a test platform for subsequent homework problems, so make it fun, nice and **sturdy**! I would like you to turn a physical printout of your code with neat, detailed comments at I I am, Tuesday, April 3rd 2012.

Grading criteria:

- 20 Points: Creativity of the project.
- 40 Points: Efficiency, readability and quality of the source-code.
- 40 Points: Electrical engineering soundness of the prototype. (Does your circuit has clamping diodes next to motors? Does your circuit use resistors after LEDs?)

During your live presentation (please see HW #15 below for more information), I will grade your project creativity and the electrical engineering soundness of your prototype.

Homework Assignment #15

I would like you to give a live demo + in-class 8 minute presentation of your prototype on Tuesday, April 3rd 2012. You will be anonymously be graded solely by your peers using the following grading criteria:

- 1) How good was the presentation? (25%)
- 2) How well were questions answered? (25%)
- 3) How interesting is the project? (25%)
- 4) How well was the project idea implemented? (25%)